



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/652,488	09/02/2003	Tetsu Sato	1640.1020	2310
21171	7590	01/12/2005	EXAMINER	
STAAS & HALSEY LLP SUITE 700 1201 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005			BLACKMAN, ANTHONY J	
			ART UNIT	PAPER NUMBER
			2676	

DATE MAILED: 01/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/652,488

Applicant(s)

SATO, TETSU

Examiner

ANTHONY J BLACKMAN

Art Unit

2676

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Objections*

1. Claim 4 is objected to because of the following informalities: "claim" and "3" should be separated on line 1 of claim 4. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claim 1 (and claims 2-4) recite the following underlined terms lacking antecedent basis limitation "fixing the location" in line 3 of claim 1;  
  
"acquiring the information" in line 5;  
  
"of the color" in line 5;  
  
"where the light rays in line 5;  
  
"cross the surface" in line 5; and surface of the" in line 5. There is insufficient antecedent basis for this limitation in the claim.
4. Claim 2 recites "forming the Hamilton's" in line 3 of claim 2;  
  
"applying the fast" in line 3;  
  
"applying the symplectic" in line 5.
5. Claim 3 recites "practicing the symplectic" in line 3 of claim 3;  
  
"acquiring the information" in line 4;  
  
"of the color" in line 4;  
  
"where the light" in line 4;

Art Unit: 2676

"rays cross the" in line 4;

"of the objects" in line 5;

6. Claim 4 recites "forming the Hamilton's" in line 3 of claim 4;

"applying the fast" in line 4.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over KAUFMAN et al, US Patent No. 5,442,733 in view of GLASSNER, US Patent No. 5,305,430.

9. As per claim 1, examiner interprets KAUFMAN et al to suggest the method of rendering using symplectic ray tracing/(volumetric ray tracing – column 15, lines 37-68, particularly note lines 40-42 for a fast discrete ray traversal), the method comprising the steps of:  
practicing the symplectic ray tracing/ volumetric ray tracing – column 15, lines 37-68, particularly note lines 40-42 for a fast discrete ray traversal);  
acquiring the information of the color where the light rays cross the surface of the objects (column 8, lines 38-58 disclose precomputed means storing the voxel attributes, such as color (column 8, lines 40-42)); and

Art Unit: 2676

rendering the objects according to the information of the color acquired (and the rendering means of column 8, lines 38-58, in addition to the actual rendering-column 12, line 55-column 13, line 10), however, KAUFMAN et al does not expressly teach fixing the location of observation, fixing view screen of observation. GLASSNER suggest the recited claim language as claimed (figures 1, and figures 7-10, column 7, lines 31-36, column 8, lines 7-17 and lines 20-37). It would have been obvious to one skilled in the art at the time of the invention to utilize the means for viewing the scene and objects, light sources and ray paths (column 7, lines 32-36) for a ray tracing algorithm (column 4, lines 10-15) of GLASSNER to modify the , including; (see column 3, line 64-column 4, line 9 -

An improved method of sampling scene information of image synthesis should provide techniques for thoroughly sampling image characteristics in a practical amount of computational time. The method should account for object-specific distributions of reflectance and transmission and for light-source variations. In addition, the method should ensure that a full distribution of image information appropriate for each object can be sampled, without undue waste. The practical and efficient creation of accurate synthetic images from a wider, more realistic range of object and lighting characteristics provided by such a method would satisfy a long felt need within the computer image synthesis community.).

10. As per claim 3, claims 1 and 3 are substantially similar except that Claim 1 is a method and claim 3 is an apparatus.

Art Unit: 2676

11. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over KAUFMAN et al, US Patent No. 5,442,733 in view of GLASSNER, US Patent No. 5,305,430 for claims 1 and 3 and further in view of CHEN et al, US Patent No. 5,588,098 for claims 2 and 4.

12. As per claim 2, KAUFMAN et al as modified meet limitations of claim 1, including, wherein the step of practicing the symplectic ray tracing (volumetric ray tracing – figure 14-shows the 3d voxel based computer graphic workstation – column 4, lines 62-65 and figure 15, the 3d discrete ray tracing processor and column 15, lines 54-55) includes the following feature not explicitly taught by KAUFMAN et al, forming the Hamilton's canonical equation by applying the fast automatic differentiation techniques; CHEN et al suggest forming the Hamilton's canonical equation by applying the fast automatic differentiation techniques ( for at least a bounding region, see the canonical means associated with "Essential Ray Tracing Algorithms" column 11, lines 40-62); and practicing symplectic integration by applying the symplectic Euler method/ rotational and translation means to the formed Hamilton's canonical equation ( for at least a bounding region, see the canonical means followed by the scaling, rotation and translation means (column 11, line s 53-56as it is associated with "Essential Ray Tracing Algorithms" column 11, lines 40-62). It would have been obvious to one skilled in the art at the time of the invention to "perform a manipulation (column 11, lines 43-44)" to a bounding box with the ray (column 11, lines 42-46 and figure 5, element 507) to utilize the bounding region means to manipulate an object the ray tracing means for "concatenation of a scaling, a rotation and a translation transformation of CHEN et al to

Art Unit: 2676

further modify the means of generating realistic images for KAUFMAN et al because the addition of the bounding region and bounding box means of CHEN et al to KAUFMAN et al as modified provides object manipulation within the bounding region and bounding box (see column 19, lines 25-34).

13. As per claim 4, claims 2 and 4 are substantially similar except that Claim 2 is a method claim and claim 4 is an apparatus.

### ***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. ROBOTHAM et al, US Patent No. 6,160,907 disclose rendering and ray tracing for media content (see figure 7).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J BLACKMAN whose telephone number is 703-305-0833. The examiner can normally be reached on FLEX SCHEDULE.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MATTHEW BELLA can be reached on 703-308-6829. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


Art Unit: 2676

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



ANTHONY J BLACKMAN  
Examiner  
Art Unit 2676

\*\*\*



MATTHEW C. BELLA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600